

Fig. 1

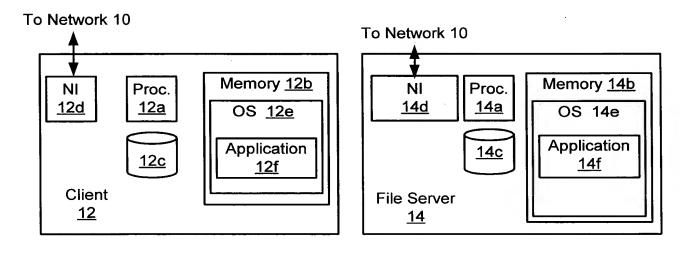


Fig. 2a Fig. 2b

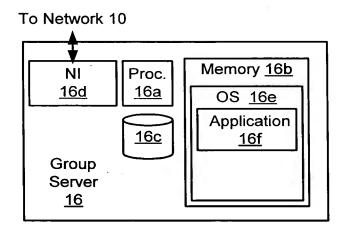


Fig. 2c

C <sub>a</sub>	{K} <sub>Ca</sub> Pub Key
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Fig. 3a

C <sub>a</sub>	{K} <sub>Ca</sub> Pub Key
С	<sup>{K}</sup> C <sub>b</sub> Pub Key
C <sub>c</sub>	<sup>{K}</sup> C <sub>c</sub> Pub Key
C <sup>d</sup>	<sup>{K}</sup> C <sub>d</sub> Pub Key

Fig. 3c

C <sub>a</sub>	<sup>{K}</sup> C <sub>a</sub> Pub Key
Ср	<sup>{K}</sup> C <sub>b</sub> Pub Key
Cc	⟨K⟩ <sub>C<sub>c</sub> Pub Key</sub>

Fig. 3b

C <sub>a</sub>	<sup>{K}</sup> C <sub>a</sub> Pub Key
С	<sup>{K}</sup> C <sub>b</sub> Pub Key
Cc	<sup>{K}</sup> C <sub>c</sub> Pub Key
C <sup>q</sup>	{K} <sub>C₀</sub> Pub Key
G <sub>1</sub>	<sup>{K}</sup> G₁ Pub Key

Fig. 3d

$$\textbf{\textit{Fig. 4a}} \quad \text{C}_{a} \{ \text{K} \}_{\text{C}_{a} \text{ Pub Key}} \{ \text{F} \}_{\text{K}}$$

$$\textbf{\textit{Fig. 4b}} \quad \text{$C_a${\scriptsize K}$}_{C_a \text{ Pub Key}} \, \text{$C_b${\scriptsize K}$}_{C_b \text{ Pub Key}} \, \text{$C_c${\scriptsize K}$}_{C_c \text{ Pub Key}} \, \text{$F$}_{K}$$

**Fig. 4c** 
$$C_a\{K\}_{C_a \text{ Pub Key }} C_b\{K\}_{C_b \text{ Pub Key }} C_c\{K\}_{C_c \text{ Pub Key }} C_c\{K\}_{C_c \text{ Pub Key }} C_d\{K\}_{C_d \text{ Pub Key }} C_b\{K\}_{C_d \text{ Pub Key }} C_c\{K\}_{C_d \text{ Pub Key }} C_c\{K\}$$

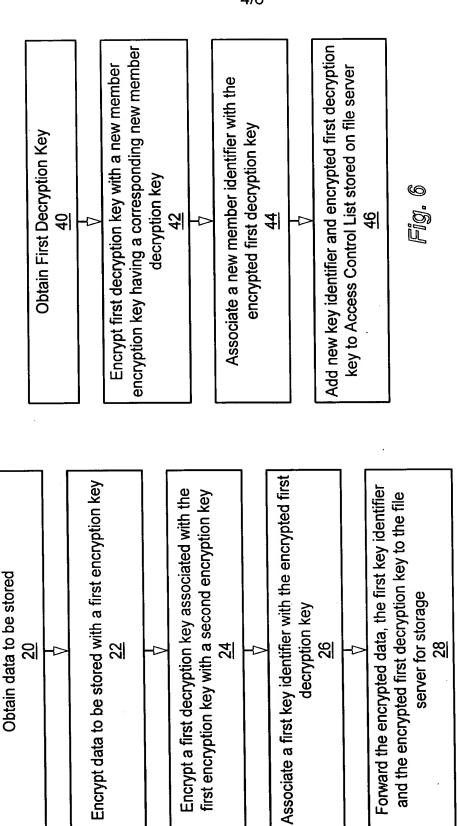


Fig. 5

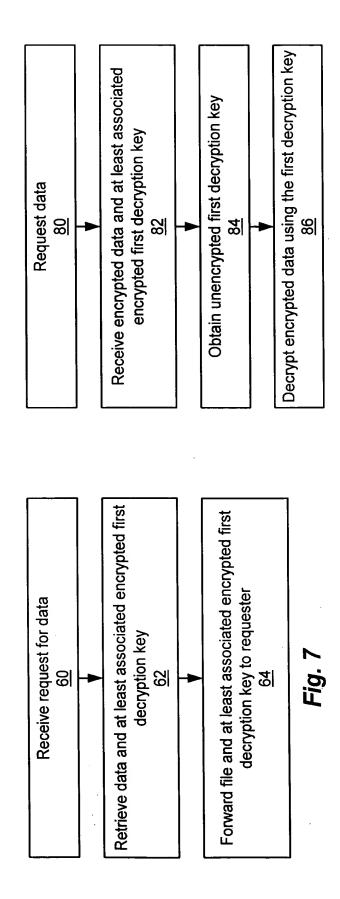


Fig. 8

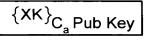


Fig. 9a

${\rm \{XK\}}_{\rm C_a}$ Pub Key
{XK} <sub>C<sub>b</sub></sub> Pub Key
<sup>{XK}</sup> C <sub>c</sub> Pub Key
{XK} <sub>C<sub>d</sub></sub> Pub Key

Fig. 9c

<sup>{XK}</sup> C <sub>a</sub> Pub Key
<sup>{XK}</sup> C <sub>b</sub> Pub Key
<sup>{XK}</sup> C <sub>c</sub> Pub Key

Fig. 9b

${XK}_{C_a}$	ub Key
${XK}_{C_b}$	ub Key
{XK} <sub>Cc</sub> F	ub Key
$\{XK\}_{C_d}F$	ub Key
{XK} <sub>G₁</sub> F	Pub Key

Fig. 9d

Fig. 10a 
$$\{XK\}_{C_a \text{ Pub Key}} \{F\}_{K}$$

$$\textit{Fig. 10b} \quad \{\mathsf{XK}\}_{\mathsf{C_a}\,\mathsf{Pub}\,\mathsf{Key}} \; \{\mathsf{XK}\}_{\mathsf{C_b}\,\mathsf{Pub}\,\mathsf{Key}} \; \{\mathsf{XK}\}_{\mathsf{C_c}\,\mathsf{Pub}\,\mathsf{Key}} \{\mathsf{F}\}_{\mathsf{K}}$$

$$Fig. \ 10c \ \ \{ XK \}_{C_a \ Pub \ Key} \ \{ XK \}_{C_b \ Pub \ Key} \ \{ XK \}_{C_c \ Pub \ Key}$$

$$\begin{aligned} \textit{Fig. 10d} \quad \{ \, \mathsf{XK} \, \}_{\mathsf{C_a} \, \mathsf{Pub} \, \mathsf{Key}} \{ \, \mathsf{XK} \, \}_{\mathsf{C_b} \, \mathsf{Pub} \, \mathsf{Key}} \{ \, \mathsf{XK} \, \}_{\mathsf{C_c} \, \mathsf{Pub} \, \mathsf{Key}} \\ \quad \{ \, \mathsf{XK} \, \}_{\mathsf{C_d} \, \mathsf{Pub} \, \mathsf{Key}} \{ \, \mathsf{XK} \, \}_{\mathsf{G_1} \, \mathsf{Pub} \, \mathsf{Key}} \{ \mathsf{F} \}_{\, \mathsf{K}} \end{aligned}$$